MADACHAULIODES RANOMAFANA, A NEW MADAGASCAN SPECIES OF CHAULIODINAE (MEGALOPTERA: CORYDALIDAE), WITH A KEY TO THE WORLD GENERA OF CHAULIODINAE[1,2]

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ABSTRACT: A new species, *Madachauliodes ranomafana* is described from Ranomafana National Park, Madagascar, and compared with *M. torrentialis*, the only other known species of the genus. An original key is given to known genera of Chauliodinae (Megaloptera: Corydalidae), of which *Madachauliodes* is a member.

Paulian (1951) erected the genus *Madachauliodes* without giving specific character states to distinguish it from other genera of Chauliodinae ("Because of characters of the wing venation, form of the labrum and of the genitalia this Malagasy megalopteran forms a separate genus"). Neither were character states of related genera given to allow comparisons. Kimmins' (1954) key to genera of Chauliodini (now Chauliodinae) did not include this genus, except to state (in a footnote) that it is related to *Platychauliodes* from South Africa because of the lack of a basal r-m crossvein in the hindwing, but differs in having a longer fork of the Cu1. The discussion of this genus in a footnote seems to indicate doubt as to its validity.

The original description of *M. torrentialis* indicated a type from the Mount Tsaratanana (14°00'S, 49°00'E) in the northern part of the country at 2500 m elevation. Although there was no indication as to the number of specimens involved in that description (nor sex of the type), males, females, pupae and larvae were illustrated. Paulian indicated that specimens of *M. torrentialis* had also been collected south of the capital (Antananarivo) in the Ankaratra Range (19°00'S, 47°15'E), especially at Manjakatompo at 2000 m elevation. There are two males and one female of this species in the USNM collection from Ranomafana National Park.

In the course of examining specimens of Neuroptera and Megaloptera from Madagascar in the collections of the National Museum of Natural History (NMNH) and California Academy of Sciences (CAS), representatives of two species of *Madachauliodes* were encountered. Because only one species had previously been named, the second species is herein described.

Materials and Methods: Male specimens had the tips of their abdomens re-

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moved and macerated in 10% KOH. These abdominal apices were then preserved in glycerin genital vials. The macerated material was examined in glycerin using a Wild Stereoscopic microscope and drawn using a camera lucida attachment. Names used for structures of male terminalia follow Glorioso (1981).

Madachauliodes ranomafana Penny, NEW SPECIES

Diagnosis: The whereabouts of the type of *M. torrentialis* is unknown. However, original description and illustrations of this species allow good comparison with an identified series of two males and one female of *M. torrentialis* in the collection of the United States National Museum. Adults of the newly described species can be separated from those of *M. torrentialis* by several characteristics: *M. ranomafana* have pale brown antennae on the basal half rather than black antennae throughout; the tarsal claw base is conspicuously broadened, strikingly contrasting with the narrow apical portion, rather than being evenly tapered to an unexpanded base; the tenth gonostyli-gonocoxite structure is relatively much larger, as large as the ninth sternite; and the tenth tergites are much more robust and apically rounded rather than elongate and apically pointed, as in *M. torrentialis* (Fig. 4).

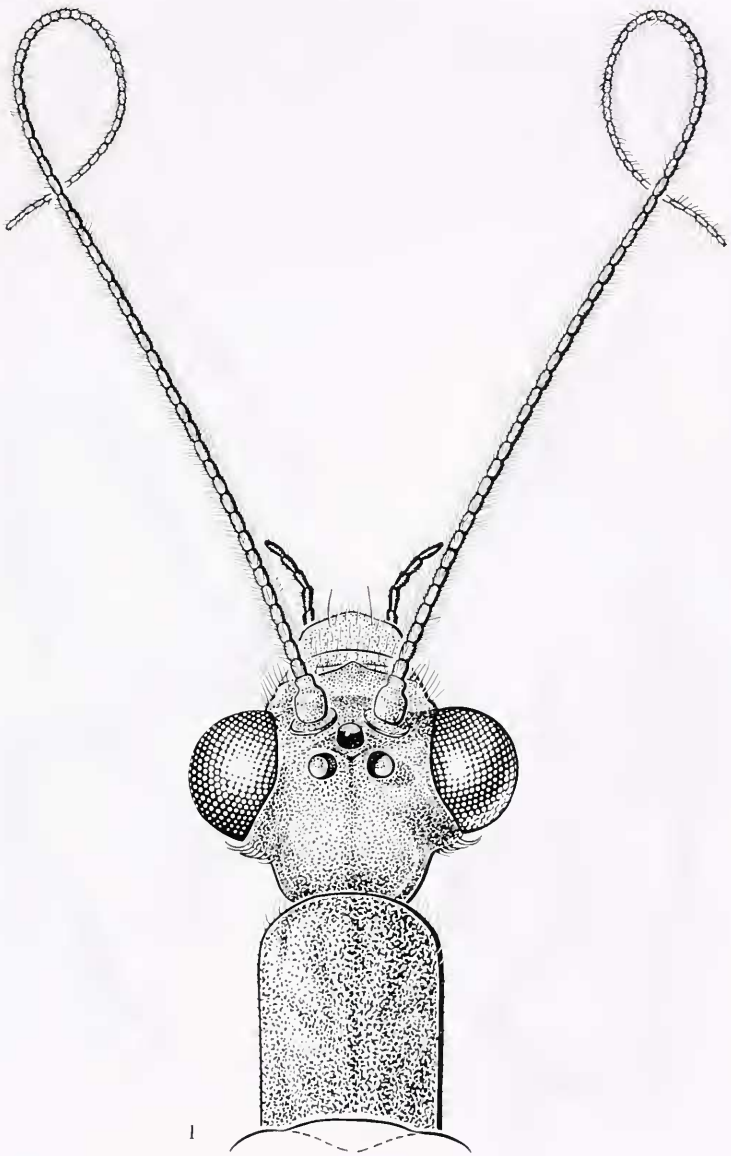
Description:

Head: Vertex, frons, clypeus and labrum yellowish brown. Vertex tapered posteriorly. Maxillary and labial palpi dark brown. Mandibles with several very small apical teeth. Three transparent ocelli in triangular configuration with black pigmentation on inner aspect of each ocellus. Antennae (Fig. 1) filiform with 55 flagellomeres; pale brown basally, becoming dark brown on apical half.

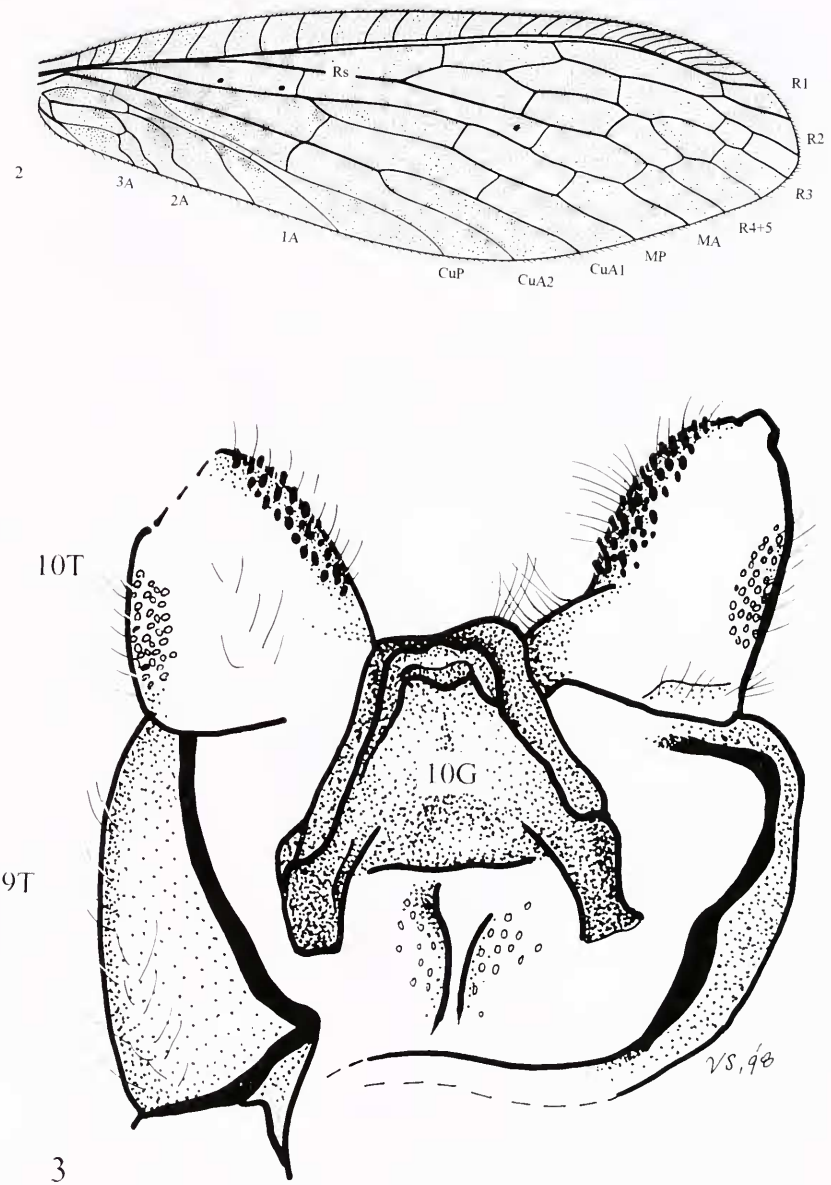
Thorax: Pronotum cylindrical, uniformly pale brown. Meso- and metanota dark brown laterally, pale brown medially. *Legs:* uniformly pale brown; bearing golden brown setae longer than tibial width. Tarsal claws three times as long as wide, evenly tapering to broader unnotched base. *Wings:* Forewing length 25-28 mm (holotype – 28 mm) (Fig. 2), membrane pale brown with numerous small dark brown infuscations. Costal area slightly broader than basal width of r cells; 16-17 costal crossveins before pterostigmal area. R2 two-branched; R3 two to three-branched; R4+5 unbranched. Three nygmata between R and M. MA and MP unbranched. Cu A two-branched, CuP unbranched. 1A, 2A and 3A each two-branched. Cell A1 closed distally by crossvein between A1 and A2. Hindwing with 12 costal crossveins. R2 two-branched; R3 two-branched; R4+5 unbranched. MA and MP unbranched. CuA two-branched; CuP two-branched. 1A two-branched; 2A two-branched; 3A unbranched.

Abdomen: Uniformly pale brown. First eight abdominal segments membranous.

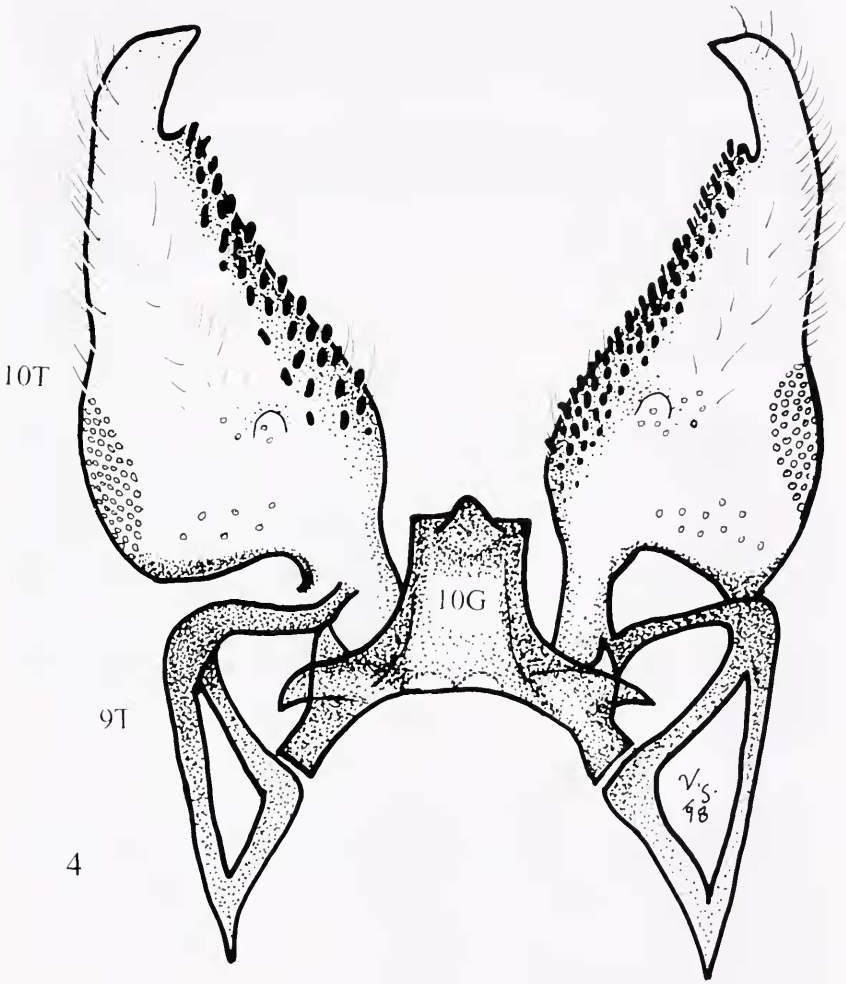
Male terminalia: Ninth sternite reduced to membranous quadrate lobe about one-half size of preceding sternites, apically slightly concave. Tenth gonostyli and tenth gonocoxites (Fig. 3) fused as an enlarged, heavily sclerotized 10th sternite dorsal to ninth sternite. Tenth sternite composed of a ventral, apically truncate lobe; a dorsal, apically truncate and recurved second lobe; and two narrow lateral arms which are flattened and expanded at their lateral margins; about as large as ninth sternite. Ninth gonostyli absent. Tenth tergites relatively short, about twice as long as wide with a medial field of small teeth; apex rounded. Callo cerci relatively large, covering one-half lateral surface of tenth tergite.



1. *Madachaulhodes ranomafana* n.sp. Head and prothorax in dorsal view.



3. *Madachaulıodes ranomafana* n.sp. Male genitalia in ventral view. 9T = ninth tergite, 10T = tenth tergite, 10G = fused tenth gonocoxites and tenth gonostyli (tenth sternite).



4. *Madachaulıodes torrentialis* Paulian. Male genitalia in ventral view.

Holotype: male: MADAGASCAR, Fianarantsoa Province, Ranomafana National Park, Talatakely (21°14'53.5"S, 47°25'36.9"E), 940 m, 30 October to 20 November 1998, Vincent F. Lee and Keve J. Ribardo, black light and mercury vapor light (CAS).

Material Examined: (all paratypes): same data as holotype, 3 males (CAS); 7 km west of village of Ranomafana [Ranomafana National Park], 1100 m, 11-17 November 1988, 1 male, C. Kremen collector (NMNH).

Distribution: At Ranomafana National Park the three known specimens of *M. torrentialis* were all collected in March, whereas the five known specimens of *M. ranomafana* were all collected in November. The geographical distribution of the two species must await study of more specimens, especially those specimens upon which the original description of *M. torrentialis* was based.

Etymology: This species name is a noun in apposition in reference to the national park where the known specimens were collected.

DISCUSSION

The genus *Madachauliodes* is one of three genera having the posterior branch of Rs unforked in the forewing, cell A1 closed distally by a crossvein between A1 and A2, and male antennae filiform. The hindwing of *Archichauliodes* contains the basal r-m crossvein, which is lacking in *Platychauliodes* and *Madachauliodes.* These latter two genera appear to form a rather compact group, but as Kimmins (1954) noted, the fork of CuA in the forewing of *Madachauliodes* extends well basad of the termination of CuP, while in *Platychauliodes* the fork originates at the termination of CuP or only slightly more basad. The ninth sternite of male *Madachauliodes* is evenly rounded or only slightly notched medially, while sternite 9 of male *Platychauliodes* bears four elongate caudal lobes.

The most commonly used key to genera of Chauliodinae is that of Kimmins in 1954. The genus *Madachauliodes* was only included as a footnote in that publication, and two additional genera have subsequently been described (*Nothochauliodes* Flint, 1983; *Orohermes* Evans, 1984). In that key some of the couplets used only geographical distributions, not morphological characters, for separating taxa. A newer key (New and Theischinger, 1993) eliminates these earlier problems, but it cannot be found in many libraries. Because Kimmins' key is outdated and New and Theischinger's is not easily accessible to many researchers, a third and original key is provided here.

Key To The World Genera Of Chauliodinae[4]

1a. Posterior branch of Rs forked in both wings (western North America) 2
1b. Posterior branch of Rs unforked, at least in forewing 3

2a. Posterior branch of M simple in hindwing; thoracic vestiture short and sparse; male tenth tergites short; female tenth tergites bifid with the dorsal lobe smaller .. *Orohermes* Evans
2b. Posterior branch of M forked in hindwing; thorax covered with long, wooly setae; male tenth tergites elongate and deeply notched; female tenth tergites bifid with long lobes ..... *Dysmicohermes* Munroe

3a. Cell A1 in forewing closed distally by anterior fork of A2 4
3b. Cell A1 in forewing closed distally by crossvein between A1 and A2 7

4a. Anterior branch of M in hindwing forked (Western Hemisphere) 5
4b. Anterior branch of M in hindwing simple (South Africa) .*Taeniochauliodes* Esben-Petersen

5a. R4 of both wings simple (Chile)..... *Nothochauliodes* Flint
5b. R4 of both wings forked (North America) 6

6a. Male antenna without whorl of erect hairs on each segment; no crossvein in apical fork of R4 in forewing (present in a few large specimens). . *Protochauliodes* Van der Weele
6b. Male antenna with whorls of erect hairs on each segment; a crossvein in apical fork of R4 in forewing (absent from a few specimens) ..... *Neohermes* Banks

7a. Male antennae filiform 8
7b. Male antennae serrate or pectinate 10

8a. Basal r-m crossvein present in hindwing (Australia, Chile) . *Archichauliodes* Van der Weele
8b. Basal r-m crossvein absent in hindwing 9

9a. Origin of CuA fork in forewing well basad of termination of CuP; male ninth sternite caudally rounded or slightly notched medially (Madagascar)... *Madachauliodes* Paulian
9b. Origin of CuA fork in forewing at or only slightly basad of termination of CuP; male ninth sternite caudally bearing four elongate lobes (South Africa)..... *Platychauliodes* Esben-Petersen

10a. Small black species (forewing length: 19 to 28 mm) with white wing maculations, particularly concentrated at mid-length; male ninth tergite very elongate, more than three times as long as wide (eastern North America) ..... *Nigronia* Banks
10b. Large black species (forewing length: 30 to 48 mm) with white wing maculations scattered throughout forewing, or forewing coloration pale brown to black, without extensive white spots; male ninth tergite at most only slightly longer than wide 11

11a. 1A in forewing with three or four branches (Oriental) ..... *Anachauliodes* Kimmins
11b. 1A in forewing with only two branches 12

12a. In forewing, fork of 2A with a definite footstalk 13
12b. In forewing, fork of 2A sessile (Oriental)..... *Ctenochauliodes* Van der Weele

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[4] Based in part on Kimmins (1954).

13a. Forewing alternating dark and pale pattern on all veins (eastern North America) ..... *Chauliodes* Latreille
13b. Forewing veins predominately brown, occasionally with paler areas (Oriental and southeastern Palearctic) 14

14a. Male antenna serrate, tenth gonostyli widely separated .. *Parachauliodes* Van der Weele
14b. Male antenna pectinate, tenth gonostyli medially fused ... *Neochauliodes* Van der Weele

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